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THE INDIAN AND NATURE

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From an extended study of the Siouan tribes of the Plains Indians, it is evident that their tribal organization and rites are based on concepts derived from observations of Nature.

These Indians belong to an observant, thoughtful, out-of-door people who for generations have lived on intimate relations with an unmodified environment. No animal but the dog was domesticated, all creatures pursued their own mode of life. With few exceptions plants were uncultivated, undisturbed in their manner of growth. No highways broke through the prairies or woodlands, the winding trails of animals served as footpaths for man. There was nothing visible to suggest any break in the continuity of the natural relation between man and his surroundings. It was amid such untouched, unforced conditions that these people attentively watched the various phases of life about them and pondered deeply on what they saw.

The Indian discerned that everywhere dual forces were employed to reproduce and so perpetuate living forms. The fructifying power of the sun was needed to make the earth fruitful and only on the union of the two, the sky and the earth, was life in its various forms made possible. Upon these two opposites, he projected human relations and made them, to a degree, anthropomorphic, the sky became masculine, the earth, feminine. Finally, he was led to conceive of the cosmos as a unit, permeated with the same life force of which he was conscious within himself; a force that gave to his environment its stable character; to every living thing on land or water the power of growth and of movement; to man it gave not only his physical capacities but the ability

to think, to will, to bring to pass. This unseen, undying, unifying force is called by the Omaha and cognate tribes, Wakonda. Through Wakonda all things came into being, are ever related, and, more or less interdependent. Consequently, Nature stood to the Indian as the manifestation of an order instituted by Wakonda wherein man was an integral part. To this order he turned for guidance when establishing those means, religious and secular, that would insure to him, individually and socially, safety and continuous life.

Finding himself to be one of a wide reaching family, the Indian planned his tribal organization upon the type of that family. He divided the people into two great sections, one to represent the sky, the other, the earth. Each of these sections was composed of a number of kinship groups, called by the Indian, Toⁿ-woⁿ-gthoⁿ, meaning, village. (These villages are spoken of as clans or gentes by students of our race.) Each village stood for some one of the forms of life seen in Wakonda's instituted order. The sky was the abode of the sun, the moon, the stars, the storm cloud with its thunder and lightning. The earth, with its land and water was the abode of the trees, the grasses, and the various animals so closely allied to man and his needs. The tribal organization aimed to mirror man's environment. The tribal rites were instituted to provide a means by which the people could approach the invisible power, believed to abide in Nature, for help, to secure food, safety and long life.

Each village (gens) had its own ceremony which was also a component part of the tribal rites, wherein all the villages (gentes) were thus represented. The ceremony of each village (gens) had a central subject, some form or force, having its abode in the sky or on the earth, and represented by a symbol. The name given to this symbol by the Omaha and cognate tribes, is Í-ni-ka-shi-ki-the, a term composed of, Í, by which; ni-ka-shi, a part of ni-ka-shi-ga, people; ki-the, make themselves; and means, that by which they make or designate themselves a people. (Students of our race have applied to this symbol the term 'totem.') As has been shown, this symbol referred to one of the forms or forces belonging to Nature as instituted by Wakonda, therefore represented in the tribal organization and the tribal rites. The symbol had a sacred significance to the people of the village (gens) in whose ceremony it held the central place. It bound the people of the village (gens) together by a sacred tie, made them distinctive among the other villages (gentes) that composed the tribe, and, it was a link between the people of the village (gens) and the invisible Wakonda. The symbol belonging to a village (gens) is always referred to metaphorically in the name

by which the village (gens) is known, and, the symbol is also treated in the same manner in the personal names ceremonially given to every child born within the village (gens). The symbol may be an animal, as, the buffalo, or a force, as the wind, and the people be spoken of by the names of the symbol of their village, as, the buffalo people, or the wind people. There are certain articles that are regarded as associated with the different symbols. The people of a village (gens) treat with marked respect and never taste or touch such articles as are supposed to be associated with their sacred symbol.

Those villages (gentes), whose symbols are of some form or force that has its abode in the sky, have their unchangeable place in the sky section of the tribe, and those, having symbols that pertain to either the land or water, have their fixed place in the earth section. During the time when tribal rites are performed, the tribe is oriented, that the people may face the ever recurring day, a symbol of life. These rites may be grouped into three classes: Those which are an appeal for the securing of food; to this class belong those rites that relate to the maize and to hunting. Those that pertain to unity and peace; to this class belong the ceremonial giving of a tribal name, the Wa-wan ceremony and certain social customs. Those which relate to war, the defence of the tribe, both as to its food supply and the life of the people. The prayer for long life, that occurs under various forms throughout the rites is understood as an epitome of these essentials to individual and to tribal life.

The Omaha distinguishes tribal rites from other ceremonies by applying to the former the term Wé-wa-çpe. The word is compound; we, signifies an instrument, a means by which something is done or brought to pass; wa-çpe, means, orderly conduct, thoughtful composure. The word, according to its context can mean, religion, law, or any similar institution. As here used it signifies a means to bring the people into order, into thoughtful composure. This term applied to tribal rites, bears testimony to a discriminating observation of the social value of religious observances, not only as a power to hold the people together by the bond of a common belief, but, as a means to augment the importance of self control and, of submission to authority. Rites designated as wé-wa-çpe, were believed to open a way between the people and the mysterious, unseen Wakonda, and, any careless or irreverent act toward them, subjected the offender to supernatural punishment.

These rites are composed of dramatic acts, the recitations of rituals and the singing of ritualistic songs. In these are embodied the myths, and allegories in which the genesis of man and his relation to Nature

are set forth. In the stories, symbols and metaphors are freely used, often in a highly imaginative manner and not infrequently touched with poetic feeling. By these means, the Indian's mind sought to bridge the gulf he recognized as stretching between him and the forms and forces of Nature that had so direct and yet so subtle a relation to his existence. These myths, allegories and metaphors form a nimbus about these rites that both illumines and yet makes elusive their meaning.

The Omaha, on his entrance into life is met by one of the tribal rites. He is introduced to the cosmos by the priest, standing outside the tent there, raising his right hand to the heavens, palm outward, he intones in a loud voice the following ritual hymn:

Ho! Ye Sun, Moon, Stars, all ye that move in the heavens;
 I bid ye hear me!
 Into your midst has come a new life!
 Consent ye, I implore!
 Make its path smooth, that it may reach the brow of the first hill.

The Winds, Clouds, Rain, Mist, that move in the air;
 The Hills, Valleys, Rivers, Lakes, Trees, Grasses of the earth;
 The Birds of the air, the Animals of the forest, the Insects that creep among the grasses and burrow in the ground are addressed in the same manner. Finally he cries:

Ho! All ye of the heavens, all ye of the earth,
 I bid ye hear me!
 Into your midst has come a new life!
 Consent ye, consent ye all, I implore!
 Make its path smooth, then shall it travel beyond the four hills.

Infancy, Youth, Maturity, Old Age, are the four hills across which lies the rugged pathway of life.

In the social life of the Indians many little dramatic acts occur significant of beliefs, that are difficult for a stranger to understand correctly. For example: A relative comes to the home of an infant and presents it with a tiny pair of moccasins with a hole cut in each sole. The Indian mother understands the tender wish conveyed by the act. The baby is thus recognized as an Omaha child, for the moccasins anticipate the ceremony in which the 'new life' is proclaimed a member of the tribe. The holes are a sign of usage, they express the giver's prayer for long life to the child. A person might enter the tent, see the tiny moccasins with the holes and exclaim: "What a long way the little one has traveled!" This too would be a prayer for long life to the child. If

an unseen messenger from the spirit world should approach the infant to bid it come with him, the child would be able to say, "No, I can't go with you, look, my moccasins are worn out!" and so, the baby would not be taken away from its mother.

Both garments and the manner of wearing them ceremonially are by the Indians invested with symbolic meanings. For instance: The Robe is significant of a man's duties or purposes according to the manner in which it is worn or adjusted about his person. The position of the eagle feather on a man's scalp-lock indicates the class of act which brought to the man the right to this war honor. Other regalia made up of different articles, each one of which has its special significance, present to the Indian warrior a picture, as of the battle field where he fought, defending his tribe, and won his honors. None of the articles employed to represent war honors or a special part taken by a man in any of the tribal rites are allowed to be used as mere adornments. A war honor can not be worn by a man until he has won the right to wear it, by the performance of a valorous act, that has been publicly recounted, approved by witnesses, in the presence of the tribe, at which time the honor appropriate to his act is accorded him, and he is authorized to wear the insignia belonging to the grade of his act.

Moccasins have a significance. Formerly each tribe had its own style of moccasin, so that a person's tribe would be indicated by the kind of moccasin he wore.

In the ceremony that marks the birth of the 'new life' into the tribal organization, the dual forces are present, the masculine sky and the feminine earth; the former, represented by the 'Four Winds' invoked to 'come hither' in the opening ritual song; and, the latter, by the stone placed in the center of the ceremonial tent. The time when this tribal rite took place was in the spring, "when the grass was up and the meadow lark singing." The child was about four years old and must be able to go about alone and unassisted. A tent was set up and made sacred, therein the priest awaited the children brought thither by their mothers, each child carried a new pair of moccasins. As the mother approached the tent with her child, she addressed the priest, saying: "Venerable man, I desire my child to wear moccasins!" and, the little one, carrying its moccasins, entered the tent alone. According to the Omaha rite and that of some of the cognates, the priest, after summoning the 'Four Winds' lifted the child upon the stone, where it stood in its bare feet facing the east, then the priest lifted it and placed it on the stone facing the south, again he lifted it and on the stone it stood facing the west, lifting it again, its feet rested on the stone as it faced the north, lastly,

the priest lifted the child and it stood on the stone with its face to the east. The priest sang the following ritual song. A free translation is given.

Turned by the Winds, goes the one I send yonder,
Yonder he goes who is whirled by the Winds,
Goes where the four hills of life and the Four Winds are standing,
There into the midst of the Winds, do I send him,
Into the midst of the Winds, standing there.

The priest then puts upon the child's feet the new moccasins, makes it take four steps, and says: "Go forth on the path of life!" A personal tribal name was now given the child, one that belonged to its father's village (*gens*) and referred to the second symbol of its rite. This name was then proclaimed by the priest to the "Hills, Trees, Grasses, and all living creatures great and small!" in the hearing of the assembled members of the tribe.

In connection with the part symbolically taken by the Winds in this ceremony, it is interesting to note, that it was the duty of the 'Wind people' to put moccasins on the feet of the dead, that they might enter the spirit land and there be recognized and able to rejoin their kindred.

After a boy had ceremonially received his tribal name, on his return home, his father cut the child's hair in an established manner which was meant to typify the sacred symbol of his village. This manner of cutting a boy's hair was kept up until the child was about seven years old. The queerly cropped heads of the boys fixed in the minds of the children the symbols belonging to the different villages (*gentes*).

The symbolism attached to garments and the manner of wearing them, already mentioned, runs through the myths, allegories and metaphors, and figures extensively in the tribal rites.

A detailed presentation of the subject of this paper is impossible within the accorded limits, but from what has been given, glimpses have been obtained of the line the Indian has pursued in his endeavor to express his view of Nature and of the relation he believed to exist between its various forms and forces and himself.

In the tribal rites can be traced the gropings of the Indians' mind to find that power, greater than man, which was the source of visible Nature; to discover a way for man to approach that power so that he could receive help from it; also to search for the meaning of the activities that were everywhere apparent. The religious and social ideas developed through this search, extending, through generations, as the rituals give evidence both directly and indirectly, were gradually evolved and

formulated in the tribal rites, wherein was set forth, with unmistakable clearness, to the people, the importance of the perpetuation of human life upon the earth, and, of the recognition, that the life-giving power of Wakonda is ever present in all things that surround man.

THE MECHANISM OF ANTAGONISTIC SALT ACTION

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1. The work on antagonistic salt action has shown that we must discriminate between two distinct groups of such phenomena. The first group is represented by the counteraction of the toxic effects of a salt with a univalent cation by a salt with a bivalent cation. I showed in 1901 that all salts with a univalent cation rapidly kill the newly fertilized eggs of the marine fish *Fundulus* when the concentration of these salts exceeds a certain limit, while the addition of a very small (though definite) quantity of a large number of salts with a bivalent cation prevents or retards this injurious action.¹ Salts with bivalent anions had no such effect. The rôle of the valency of the cation in these phenomena of antagonism was unmistakable and was pointed out in the same papers as was also the relation to certain rules in the precipitation of colloids, but it was not possible to indicate an antagonistic action on colloids between salts with univalent and bivalent cations. I suggested later that the rapid death of the eggs in the salts with univalent cations was due to a diffusion of the salts into the eggs, while the addition of the salt with a bivalent cation prevents or retards this rapid diffusion,² and this suggestion was supported by later experiments.

It therefore appeared from these observations that the salts with monovalent cations increase the permeability of the membrane when their concentration exceeds a certain limit, and that the addition of a trace of a salt with a bivalent cation, e.g., CaCl_2 , diminishes the permeability. This idea received support in the floating experiment of the writer with *Fundulus* eggs³ and in Osterhout's experiments on the galvanic resistance of *Laminaria* in NaCl and CaCl_2 solutions.⁴

The second group of antagonistic phenomena is represented by the following experiments. In 1911 Loeb and Wasteneys found that a KCl solution in the concentration in which this salt is contained in the sea water is toxic for the marine fish *Fundulus*, while the addition of NaCl in a definite ratio (17 molecules or more of NaCl to 1 molecule of KCl) annihilates the toxic effect of KCl . Na_2SO_4 was about twice as